

3770

Diag. Cht. No. 1242-2

Department of Commerce and Labor
COAST AND GEODETIC SURVEY

Superintendent.

State:

Georgia

DESCRIPTIVE REPORT.

Hydrographic Sheet No. 3770

LOCALITY:

Off-shore Hydrography -
St. Simon Sound to
St. Johns River

1915

CHIEF OF PARTY:

R. F. Luce

11-4645

0223

DESCRIPTIVE REPORT TO ACCOMPANY HYDROGRAPHIC SHEET

No. A Field (Inshore)

Locality - Coasts of Georgia and Florida.

AREA The field work on Hydrographic Sheet No. A Field (Inshore) was performed between March 3, 1915 and June 17, 1915 under instructions of the Superintendent of the Coast and Geodetic Survey, dated January 12, 1915, January 21, 1915, February 10, 1915, and June 4, 1915. The work lay off the coasts of Georgia and Florida, extending along the coast from St. Simon Lighthouse, south to the old Continental Hotel, about four miles south of the St. Johns River, and extended to a distance of about twenty-seven miles off the coast.

CHARACTER OF THE DEVELOPMENT. Sounding lines were run in a true east and west direction approximately normal to the depth curves, the most northerly line coinciding with latitude $31^{\circ} 09' N$, and extending from longitude $81^{\circ} 19' W$ to longitude $80^{\circ} 48' W$, the most southerly line with latitude $30^{\circ} 20.5' N$, and extending from longitude $81^{\circ} 23' W$ to longitude $80^{\circ} 52' W$, comprising a total area of approximately 1379 square miles (statute).

Sounding lines were spaced a little less than a mile apart and extended from the three fathom curve to a point sufficiently beyond the generalized ten fathom curve, to define the curve completely and accurately in all parts. Between the ten fathom curve and the offshore end of the sheet, lines were spaced two miles apart, except that between the northern limit of the sheet and the Brunswick Light Vessel, the lines were spaced not over a mile apart, this spacing

being due to the general shoaler depths, the irregular character of the bottom and the occurrence of shoals and banks. Off the entrance to St. Simon Sound, St. Andrew Sound, Cumberland Sound, and the St. Johns River, lines were spaced not over one half a mile apart, the development extending about five miles in an off-shore direction. Off Fernandina, Florida on account of the shoal and irregular character of the bottom an average distance of three hundred meters was maintained between lines, covering an area of about 30 square miles. Wherever shoal indications were obtained, a close examination of the bottom was made by running lines parallel to the ridge of the shoal, to completely define its extent and character.

CONTROL OF WORK

Shore Signals As it was intended to carry fixed positions to the greatest practicable distance offshore, six tall hydrographic signals were erected and located by a special party: Groves, Lee, Carnegie, Center, South, and Mt. Cornelia, the last named being an old triangulation station. These signals were surmounted by board targets 11 feet wide by 22 feet high, the upper half being painted black, the lower half white. In order to increase their visibility parties from the ship dressed the signals with cloth according to the following scheme. The entire target was painted black, and black signal cloth 11 feet wide by 8 feet high was added below the target.

Below this, white cloth was added, 11 feet wide by 30 feet high. This gave a black area 30 feet in height at the top of the signal, which showed to advantage above the tree line, especially against the afternoon sun, and a white area 30 feet in height which showed against the tree line, to best advantage with the morning sun shining upon it. Black side curtains of cloth were also added, to increase the visibility of the signal along the coast. These signals proved entirely satisfactory, and could be used in general to a distance of about nine miles off shore under ordinary conditions, and frequently much farther.

Prominent objects whose positions were previously determined by triangulation, such as lighthouses, tanks, and chimneys were also used as signals. All other suitable prominent objects were located by sextant angles from the ship and used for signals.

Buoy Signals In order to increase the distance off shore at which Construction. fixed positions could be obtained, bell or whistle buoys, four miles apart and extending in a line parallel to the coast and about 13 miles offshore, were placed by the Lighthouse Department, and were located and used by the ship as signals. To render these buoys visible the necessary distance, superstructures, in the form of quadrupods were added. These consisted of four lengths of extra heavy one inch black iron piping, spaced equally about the circumference of the buoy and attached thereto by eye-bolts and siezed with siezing wire. The pipes were brought together at their upper ends, a length of one inch pipe three and one half

feet long, surrounded by soft wood splints, having been previously inserted between the upper ends of the legs of the quadrupod, and the whole was bound together securely by siezing wire. A wooden staff carrying flags of black signal cloth was inserted in this short length of piping.

Location These buoys were located by sextant angle cuts from successive anchorages of the ship. A round of angles was observed at each anchorage between all shore and buoy signals visible, the circle being closed and the angles adjusted; extremely good locations for the buoys thus being obtained. The Brunswick Light Vessel was included in the line of buoys, and located and used in the same manner as the buoys were. From the beginning of the work through April 13 the Relief Light Vessel was occupying the station. On April 14 both the Relief and the Brunswick Light Vessels were on their stations. The position of the marking buoy for the light vessel was determined by bringing the Bache alongside the buoy and noting the bearing of the Relief Light Vessel and at the same time measuring the angle between the horizon and the Relief Light Vessel from the crow's nest of the Bache. The position of the Brunswick Light Vessel was then determined in the same manner, this location being checked by subsequent sextant angle cuts. From April 14 until the end of the work the Brunswick Light Vessel was on her station and used as a signal. All the important offshore navigational buoys were located, and used as signals when necessary.

SURVEY METHODS

The work was done entirely with the ship and consists of two distinct classes: (1) inshore hydrography carried on within sight of shore or buoy signals, where fixed positions were obtained, (2) offshore hydrography beyond the range of signals, where the position of the ship was obtained by a special type of careful dead reckoning.

(1) INSHORE HYDROGRAPHY This included practically all the work extending offshore to a line about two and one half miles outside of the buoys. Positions were obtained for the greater part by sextant angles, although occasionally it was necessary to resort to a single angle and a bearing. The majority of such positions checked with the subsequent angle positions obtained. Positions obtained by either method proved somewhat weak when approaching close to the line of buoys, and adjustments were made, or the position plotted by the course made good and the log, where deemed justifiable. Soundings were obtained entirely with the hand lead, the depth of the water never exceeding 12 fathoms, soundings being taken at intervals varying from one half minute to one minute. The speed of the ship averaged four and one half miles an hour, thus giving a spacing of soundings varying from 70 meters in shoal water to 140 meters in a depth of 10 fathoms or over.

(2) OFFSHORE HYDROGRAPHY This extended from the limits of the previous work to the offshore end of the sheet.

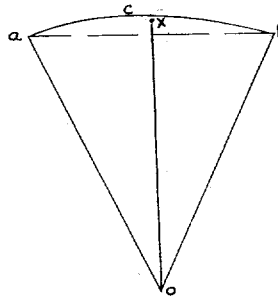
Method of sounding. Soundings were taken with the hand lead at intervals of one minute to a depth of about 14 fathoms. In order to obtain up

and down soundings at greater depths, with the speed of the ship at about four and one half miles an hour, the lead was carried forward to a point near the bow by means of a traveller running on a trolley, where the lead was released. The sounding was obtained from the quarterdeck, and the leadline reeled in by a reeling machine. With this method, one and one half minutes were required between soundings, and occasionally two minutes. Soundings were therefore spaced from 140 to 280 meters.

Dead reckoning. Each line began and ended with a sextant angle fix or a departure from a buoy. Current observations were made at the beginning and end of the line by current pole, and the ship was anchored every two hours on the line to obtain a current observation. Each two hour run was then corrected for current drift and in laying out courses while running line, allowance was made for this drift. The velocity of the wind was obtained at all anchorages by means of an anemometer, which was also read while underway upon changing course, anchoring, and heaving up. The leeway made by the ship was estimated from these readings. Error due to this cause was kept at a minimum by running lines only under favorable weather conditions. The patent logs used were tested twice during the season, once over a measured course on the working grounds and once over the speed trial course at Kent Island, Md., by running the ship at various speeds over the course in both directions to eliminate effects of wind, sea, and current. Correction factors for each log were

thus obtained for various speeds and all log distances were thus corrected before being used in plotting. The errors of both the standard bridge compass, used in setting the courses and the quarterdeck compass used in making current observations, were determined from ship swings, the sun being used for comparison, and all courses and bearings plotted were first corrected by the results of these swings. The variation obtained from charts varied from zero to $1/2^\circ$ E in area covered. Log readings were taken every quarter hour while under way, from which the positions were plotted on the sounding line.

Plotting. The true course steered and the corrected log distance for a two hour run between anchorages were first plotted, as a dash pencil line, which was corrected first for wind leeway and then for drift due to current. In the annexed diagram, oa represents the drift due to the current observed at the beginning of a two hour run, ob the drift due



to the current at the end of a two hour run, and the curve acb, passed through a and b, is considered to be the most probable variation of the current during the two hours. (This line is drawn by plotting all the currents observed on a line through a common initial and by passing a smooth curve through their ends.) A mean current, represented by ox,

is then assumed for the two hour run, by choosing x between the curve acb and the straight line ab and nearer the curve. Currents are plotted on the sheet as full lines at the end of each dash line, representing a two hour run. The discrepancy between the position of the end of the line as determined by the reckoning and by direct angles on signals, termed the closure, was proportioned throughout the entire line on a time basis. The final line thus adjusted was plotted as a full pencil line, on which were plotted the positions determined by the log readings. The average closure of the 22 dead reckoning lines run was 0.87 miles.

TIDES

A tide staff was established on St. Simon Island, near St. Simon Lighthouse, and was read from March 8 to June 19, 1915. The Coast and Geodetic Survey automatic tide gauges at Fernandina and at St. Augustine were in operation during the work on this sheet. Tidal differences inside and outside the bar off St. Simon Sound have been determined by the Army Engineers.

Respectfully submitted
R. F. Lucie
Asst. C. & G. Survey
Comdg. St. Beebe.

Statistics for Hydrographic Sheet No. "A" Field

Date	Letter	Volume	Positions	Soundings	Miles Statute	Vessel
1915	(Red)					
March 18	A	1	35	426	31.7	Bache
" 19	B	1	67	842	71.4	"
" 20	C	1	72	670	45.3	"
" 22	D	2	28	268	13.1	"
" 23	E	2	85	675	43.8	"
" 27	F	2	43	356	40.6	"
" 30	G	2	41	462	40.3	"
April 5	H	3	112	972	56.1	"
" 6	J	3	137	997	66.3	"
" 7	K	4	106	861	59.1	"
" 8	L	4	20	166	9.8	"
" 9	M	4	37	250	13.1	"
" 10	N	4	11	65	3.5	"
" 16	P	4&5	141	1002	64.2	"
" 17	Q	5	61	545	46.8	"
" 19	R	5	29	281	15.4	"
" 21	S	5&6	65	642	62.6	"
" 22	T	6	146	1256	87.2	"
" 23	U	6&7	164	1069	81.7	"
" 24	V	7	3	---	---	"
" 27	W	7	133	1033	66.1	"
" 28	X	7	66	535	28.4	"
" 29	Y	8	109	929	59.0	"
May 1	Z	8	17	97	4.6	"
" 3	A'	8	78	467	28.6	"
" 5	B'	8&9	137	898	54.9	"
" 6	C'	9	32	248	13.7	"
" 13	D'	9	155	1055	52.3	"
" 14	E'	9&10	149	1023	62.1	"
" 15	F'	10	112	649	35.4	"
" 17	G'	10	30	254	12.3	"
" 18	H'	10&11	88	621	43.0	"
" 19	J'	11	40	335	38.0	"

Carried forward ----- 2549 12,949 1,350.4

Date	Letter	Volume	Positions	Soundings	Miles Statute	Vessel	
Brought forward ----			2,549	19,949	1,350.4		
1915	(Red)						
May	20	K'	11	200	1,053	64.6	Bache
"	21	L'	11	10	39	2.7	"
"	24	M'	12	62	290	29.9	"
"	25	N'	12	136	773	45.9	"
"	27	P'	12&13	76	782	66.4	"
"	28	Q'	13	151	1,014	80.0	"
"	29	R'	13	37	404	37.1	"
June	1	S'	13&14	76	409	23.9	"
"	2	T'	14	175	1,076	65.3	"
"	3	U'	14&15	124	937	53.6	"
"	5	V'	15	56	260	15.7	"
"	8	W'	15	99	513	28.4	"
"	10	X'	15	135	638	56.2	"
"	12	Y'	15&16	65	424	30.5	"
"	14	Z'	16	151	1,005	70.2	"
"	15	A"	16&17	183	1,106	103.4	"
"	16	B"	17	165	1,099	86.2	"
"	17	C"	17&18	198	1,079	75.2	"
Totals -----			4,668	32,850	2,285.6		

Tidal Note:

A tide staff was established on St. Simon Island near St. Simon Lighthouse. Coast and Geodetic Survey Automatic Tide Gauges were in operation at Fernandina, Fla., and St. Augustine, Fla.

JFL
Nov. 27, 1915.

HYDROGRAPHIC SHEET 3770.

CHARTS (H)

B. P. J.
N. C.

Off coast of Georgia, by Assistant R. F. Luce
in 1915.

TIDES.

	St. Simon Light. ft.	Fernandina. ft.
Mean low water, or plane of reference on staff	3.3	2.9
Lowest tide observed " "	1.0	0.1
Highest " "	11.9	16.7
Mean range of tide	6.4	6.0

Allowance was made for difference in time of
tides at gauges and at place of sounding.

2. 2. 2.

Hyd. Sheet No. 3770

Within the limits of this sheet, the ground has been carefully and systematically covered and shoal indications examined and closely developed.

From the shoreline out to about two miles beyond the line of buoys, the work is controlled by the usual sextant angles between three signals on shore. On this portion of the work the crossings agree perfectly. The protracting was tested at frequent intervals and found to be correct.

From two miles east of the line of buoys to the eastern edge of the sheet, the lines are run entirely by dead reckoning. Using the compass course, corrected for variation and deviation, and the log distance after applying the log correction, and then applying the correction for current and wind. By this method the lines were plotted out to the eastern limits of the work and back again until a fixed point was reached, when the closure was made and the error distributed in the usual manner. On all the dead reckoning work, current readings were taken every two hours. Without these and the resultant current corrections, it would have been impossible to plot these lines with any degree of accuracy.

On about fifty per cent of these lines, the plotting was tested and found to be carefully and accurately done.

On the north east corner of the sheet, just outside the ten fathom curve, the ground is very broken. There are several bad crossings here, probably due to the broken character of the ground and to the fact that these lines are run by dead reckoning and are a considerable distance from the starting point. The line beginning at pos. 1A and ending at pos. 4B, is the worst of these. A portion of this line, from pos. 17A to pos. 27A, was rejected on the evidence of the other lines.

All the lines on Hyd. Sheet No 3769, which fall within the limits of this work, were plotted on this sheet and may be distinguished by their position numbers, shown in green. The soundings on these lines, common to both sheets are not identical. Owing to the difference in scale, they were plotted independently and are more complete on this sheet than on Hyd. 3769. The curves were drawn from the combined soundings.

P. L. Johnston

Hyd. Sheet 3770.

A 29 ft. shoal was found at about Lat. $30^{\circ}31'45''$, Long. $81^{\circ}21'30''$ between 2 40 ft. soundings. There is considerable doubt about the existence of this 29 ft. sounding and an investigation of it should be made.

S. L. Rosenberg.

Soundings plotted and inked by R. L. J. Verified by S. L. R.

Soundings in feet.

Applied to chart 453 reconstr. 8/15/57 - NR north of $30^{\circ}45'$